

# BARNES®

## SGPC 1 HP Service Manual



**CRANE**®

A Crane Co. Company

PUMPS & SYSTEMS

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# SAFETY FIRST!

Please Read This Before Installing Or Operating Pump. This information is provided for **SAFETY** and to **PREVENT EQUIPMENT PROBLEMS**. To help recognize this information, observe the following symbols:



**IMPORTANT!** Warns about hazards that can result in personal injury or indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

**CAUTION!** Warns about hazards that can or will cause minor personal injury or property damage if ignored. Used with symbols below.

**WARNING!** Warns about hazards that can or will cause serious personal injury, death, or major property damage if ignored. Used with symbols below.



Hazardous fluids can cause fire or explosions, burns or death could result.



Extremely hot - Severe burns can occur on contact.



Biohazard can cause serious personal injury.



Hazardous pressure Eruptions or explosions could cause personal injury or property damage.



Rotating machinery Amputation or severe laceration can result.



Hazardous voltage can shock, burn, or cause death.

Only qualified personnel should install, operate, and repair pump. Any wiring of pumps should be performed by a qualified electrician.



**Warning!** - To reduce risk of electrical shock, pumps and control panels must be properly grounded in accordance with the National Electric Code (NEC) or the Canadian Electrical Code (CEC) and all applicable state, providence, local codes and ordinances.



**Warning!** - To reduce risk of electrical shock, always disconnect the pump from the power source before handling or servicing. Lock out power and tag.

Prevent large articles of clothing, large amounts of chemicals, other materials or substances such as are uncommon in domestic sewage from entering the system.

During power black-outs, minimize water consumption at the home(s) to prevent sewage from backing up into the house.

Always keep the shut-off valve completely open when system is in operation (unless advised otherwise by the proper authorities). Before removing the pump from the basin, be sure to close the shut-off valve. (This prevents backflow from the pressure sewer.)

Keep the control panel locked or confined to prevent unauthorized access to it.

If the pump is idle for long periods of time, it is advisable to start the pump occasionally by adding water to the basin.



**CAUTION!** Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



**WARNING!** Do not pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.

Do not block or restrict discharge hose, as discharge hose may whip under pressure.



**WARNING! - DO NOT** wear loose clothing that may become entangled in the impeller or other moving parts.

**WARNING!** Keep clear of suction and discharge openings. **DO NOT** insert fingers in pump with power connected.

Make sure lifting handles are securely fastened each time before lifting. Do not operate pump without safety devices in place. Always replace safety devices that have been removed during service or repair.

Do not exceed manufacturers recommendation for maximum performance, as this could cause the motor to overheat.

Secure the pump in its operating position so it cannot tip over, fall, or slide.

Cable should be protected at all times to avoid punctures, cut, bruises and abrasions - inspect frequently.



Never handle connected power chords with wet hands.

To reduce risk of electrical shock, all wiring and junction connections should be made per the NEC or CEC and applicable state or province and local codes. Requirements may vary depending on usage and location.



Submersible Pumps are not approved for use in swimming pools, recreational water installations, decorative fountains, or any installation where human contact with the pumped fluid is common.

Do not remove cord and strain relief. Do not connect conduit to pump.



Products Returned Must Be Cleaned, Sanitized, Or Decontaminated As Necessary Prior To Shipment, To Insure That Employees Will Not Be Exposed To Health Hazards In Handling Said Material. All Applicable Laws And Regulations Shall Apply.



Bronze/brass and bronze/brass fitted pumps may contain lead levels higher than considered safe for potable water systems. Various government agencies have determined that leaded copper alloys should not be used in potable water applications. For non-leaded copper alloy materials of construction, please contact factory.



**IMPORTANT!** BARNES® Pumps, Inc., is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse, or abuse of pumps or equipment.

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# TOOL LIST



- Crescent Wrench
- Torque Wrench
- Hammer
- Brass Flat Punch
- 3/8" Ratchet
- 1/2" Wrench Open End
- 2 - 3/16" Flat Blade Screwdrivers
- 1/4" Nut Driver
- 1/8" Allen Wrench
- 5/32" Allen Wrench
- 5/16" Allen Wrench
- Needle-Nose Pliers
- Inside & Outside Snap Ring Pliers
- 1/4-20 Bolt
- Seal Pushers - Part No: TL-21381
- "Bullets"-Thread Protectors - Part No: TL-21381 / TL-21375
- Grease-White Food Grade with PTFE
- Seal Lubricant (P-80)
- Dielectric Cooling Oil (Check Chart)
- Green 609 Loctite
- Pressure Gauge Kit - Part No: 085343
- Megohmmeter & Multi-Meter w/Clamp



# SGPC 1 HP Disassembly

## Visual Inspection of Pump

Quick visual inspections can save time. A visual Examination of the pump for damage to cords, controls, or cutter, and a thorough electrical check should be performed to determine a pumps condition.

### Cut Cords

Check the cord(s) for any cuts or gouges. If there is any noticeable damage, do not use the cord, remove, and install a new cord if applicable.

### Megger the Pump Leads - (Megohmmeter)

This test is to determine the strength resistance of the cord insulation. The meter will test zero  $\Omega$  if the cord insulation is damaged or breaking down thus allowing current to flow through the insulation.

This test can best be performed if the pump leads are disconnected from the control panel, or the junction box. To perform this test, touch one lead to the green ground. Touch the other lead to the white wire. Repeat this test with ground to black. To pass this test, a cord set must have a reading of 5m $\Omega$  or higher on all leads. Note that a "0" reading indicates a dead short.

**CAUTION:** After performing a megger test **ALWAYS** discharge cord set leads to ground.

### Hi-Pot (High Potential) Insulator Test (if required)

A Hi-Pot test of pump leads is more accurate than a megger test, either method will indicate the condition of cord insulation. In most cases, it is not necessary to do both.

This test detects non-visible insulator failures. To perform the HiPot test, a 500 VOC Megohmmeter is needed. Touch the green ground lead from the pump to one of the meter leads, and the other meter lead to one of the power leads. Repeat this test with all of the power leads. A resistance reading no less than 20m $\Omega$  **IS ACCEPTABLE**.

**CAUTION:** After performing a Hi-Pot test, **ALWAYS** discharge cord set leads to ground.

### Check the Resistance - (Multi-Meter)

**CAUTION:** Perform this test with the pump off.

This test is to check for proper wiring and also to determine if the motor windings are good.

To perform this test, touch one meter lead to the black cord and the other meter lead to the white cord. The result of this test should give a reading of 2.3 to 9.7. If the results vary, the windings or wiring is faulty.

Compare the readings to the readings found on motor winding resistance charts (*Table 1*). Readings should be within  $\pm 5\%$  of nameplate.

**Table 1: Motor Winding Resistance**

MODEL No.	HP	VOLT	PH	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D.	CORD LENGTH	WINDING RESISTANCE MAIN-START
SGPC1014L	1	120	1	D	18.4	38	12/3	SOW	.61 $\pm$ .02	15 FT.	.6 - 6.2
SGPC1024L	1	240	1	D	9.2	17.5	12/3	SOW	.61 $\pm$ .02	15 FT.	2.3 - 9.7
SGPC1024AU	1	240	1	D	9.2	17.5	12/3	SOW	.61 $\pm$ .02	30 FT.	2.3 - 9.7

### **Jammed or Worn Cutter**

Check the cutter for freedom of movement, the cutter should move by hand. Also check for excessive wear, if there is evidence of this, then the worn piece(s) must be replaced.

**NOTE:** If the cutter is excessively worn, the shredding ring may be reversed.

### **Check Valve Evaluation**

To check the performance of the check valve, remove the white PVC cap on the top of the valve. Perform a visual inspection of the ball to determine that the ball is not grooved, pitted, or distorted. In addition, look in the valve to make certain it is free of obstructions that may cause the valve ball to not seat properly.

### **Check for Stator / Rotor Abrasive Wear**

The stator and rotor surfaces should remain smooth throughout normal usage. If there is evidence of excessive wear, including scaring or grooving of the stator boot or rotor surface, then the bottom of the basin could contain abrasives. Abrasives to look for are sand and or rocks.

### **Stator Failure Evaluation**

Stator failure is determined by looking at the inside and outside of the stator boot. Any evidence of a tear or crack on the surface of the boot is an indication that the stator must be replaced.

### **Moveable Alignment**

To prevent the moveable from leaking, make a visual check from the face of the moveable to the lower pump bracket. The face of the moveable needs to be parallel to the lower pump bracket. When assembled on the pump, the moveable face will be perpendicular to the centerline of the pump discharge.



## Cutter Removal

**CAUTION:** SHARP EDGES, USE CAUTION WHEN REMOVING CUTTER.

**NOTE:** PRIOR TO DISASSEMBLY, MARK CASTINGS WITH A PERMANENT MARKER ON ALL JOINTS TO ASSIST IN REALIGNMENT.

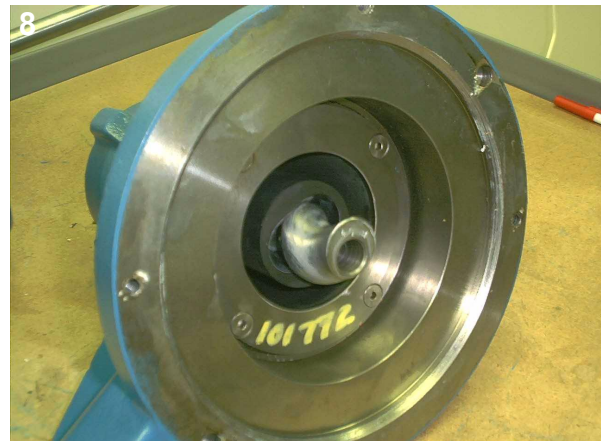
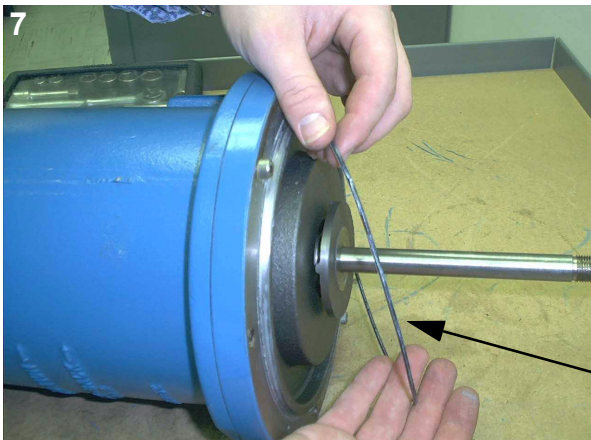
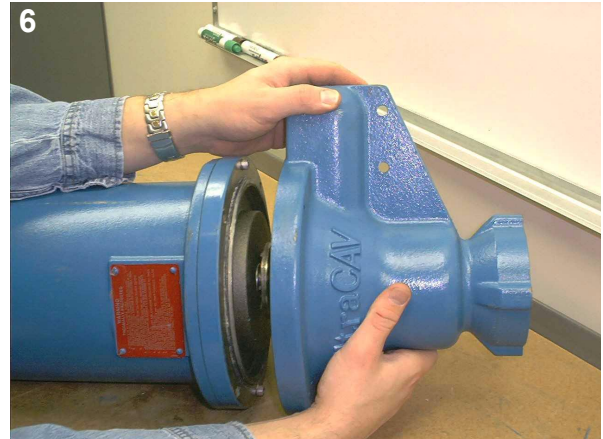
With the pump lying on its side, remove the cutter retaining screw and washer. The screw has green loctite so apply heat to the screw, wedge a flat blade screwdriver between cutter and shredding ring and remove screw. Using a flat punch and hammer, tap the cutter in a counterclockwise direction and remove. A large flat bladed screwdriver may be required to hold the motor shaft while unthreading the cutter.

**DO NOT ATTEMPT TO REMOVE THE VOLUTE BEFORE REMOVING THE RADIAL CUTTER.**



## Suction Housing

Loosen the four 5/16 hex head bolts and lock washers from the rim of the motor housing. Remove suction housing and O-ring from the bottom of the seal plate.

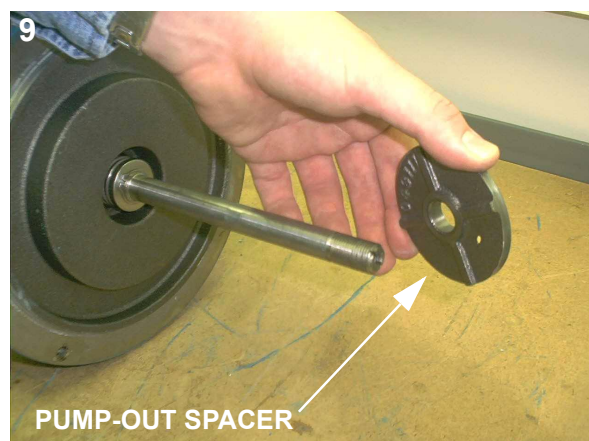


INSPECT O-RING FOR SIGNS OF WEAR  
AND ABRASION



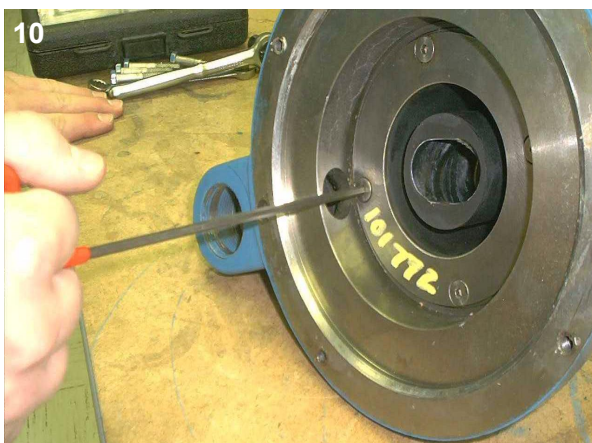
## Pump Rotor & Pump-Out Spacer

The pump rotor may have come off with the removal of the suction housing and may be inside the pump stator. If it did not, slide the rotor off the shaft. Also slide the pump-out spacer off.



## Pump Stator

The stator has four allen screws securing it to the suction housing (The screws are secured with loctite, apply heat to remove screws). Loosen the screws and lift the retainer plate off. Pull the stator out of the suction housing. The shredding ring is press fit to the suction housing and requires the use of a bearing puller to remove.



**NOTE:** After a number of years of service or whenever the shredding ring cutting edges dull, the ring can be pressed out of the volute and reversed to utilize the opposite cutting edges. To maintain efficient grinder pump operation, care should be taken to keep both the radial cutter and shredding ring cutting edges sharp. Neither part can be sharpened to renew the cutting ability. The radial cutter must be replaced and the shredding ring either reversed or replaced.

## Oil Removal, Pressure Check

Set unit on its side and remove plug from motor housing, drain all oil from motor chamber.



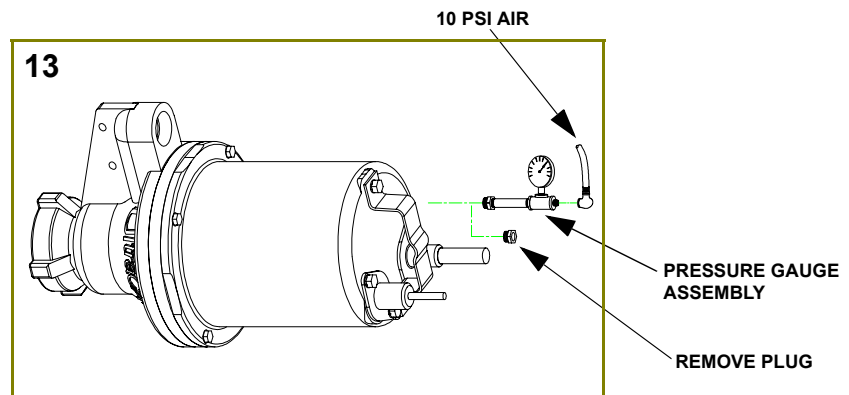
### Perform Pressure Check

**NOTE:** This test is to be performed with NO oil in the housing.

**CAUTION:** Make certain that cord set is attached to pump. Performing the pressure check without the cord set on may cause the terminal block to blow out.

To check the pump for any seal leaks, attach the pressure gauge assembly using pipe sealant. Tighten the fitting into the hole. Pressurize the gauge to 8 to 10 psi. If pressure drops, use a soap solution around the sealed areas to determine the location of the leaks.

If after 5 minutes the pressure is still holding constant, and no bubbles are observed, slowly bleed the pressure and remove the gauge assembly. Replace the pipe plug using sealant.

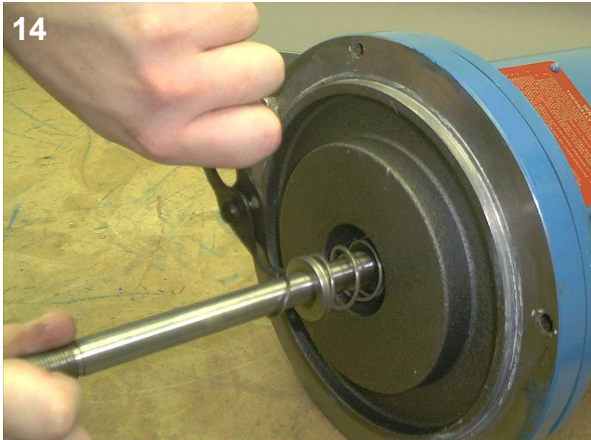


## Outer Shaft Seal

**CAUTION:** Handle seal parts and shaft with extreme care. Do not scratch or mar lapped or machined surfaces.

Remove snap ring and rotating member from shaft. Examine all seal parts and especially contact faces.

DO NOT interchange seal components. Replace the complete seal assembly if replacing seal.



Inspect seal for signs of wear, such as uneven wear pattern on stationary members, chips, and scratches on either seal face.





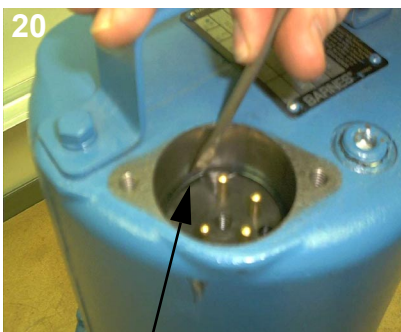
## Motor Housing

**NOTE:** Position unit upright, using wooden blocks to avoid resting unit on the lower shaft.

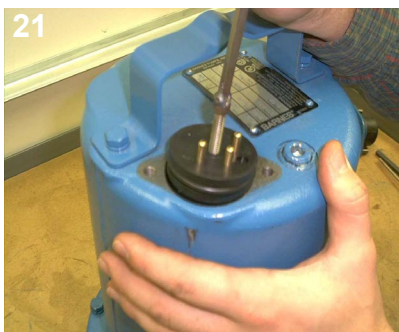
Loosen cable clamp bolts and lock washers from motor housing. Remove cord from motor housing by pulling straight up while using a rocking motion.



Remove retaining snap ring with a medium flat tip screwdriver. Using a 1/4-20 bolt, thread it into the center of the terminal block. Pull straight up with a rocking motion to remove the terminal block. Disconnect all wire connections noting where each wire is connected. The bottom of the block has a number located next to each pin for reference. If pump is equipped with closed valve protection, remove in same manner as the power cord.

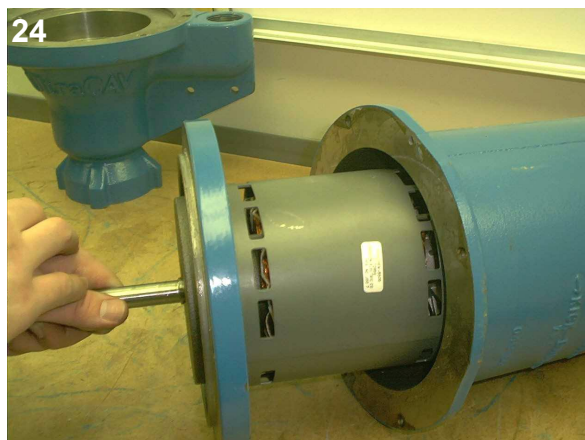
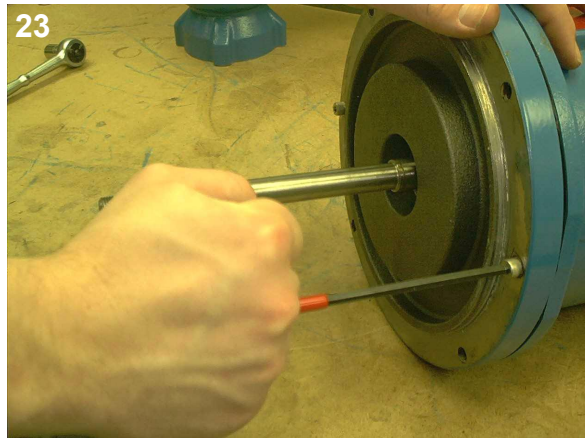


Pry Snap Ring out  
with a screwdriver



## Seal Plate

Remove two allen screws from seal plate. Remove seal plate and square ring from intermediate coupling.



## Motor

With the pump still on the blocks, loosen the motor stator bolts and lift the capacitor and bracket off the motor. Lift off the motor stator. Check that the wave washer is present when removing the motor stator.



**CAUTION:** Use care not to damage motor windings when removing motor.



Pry motor using two screwdrivers



## Bearing

Press the motor rotor out of the seal plate using an arbor press. Make sure to press straight down on shaft while protecting threads from damage. Use a wheel puller or arbor press to press bearing off of the motor shaft. The upper motor bearing can be removed with a wheel puller.



Remove the stationary seal by pressing out with a flat tipped screwdriver. Examine all seal parts and especially contact faces. Inspect seal for signs of wear, such as uneven wear pattern on stationary members, chips, and scratches on either seal face.

**DO NOT** interchange seal components, replace the complete seal assembly if replacing seal.

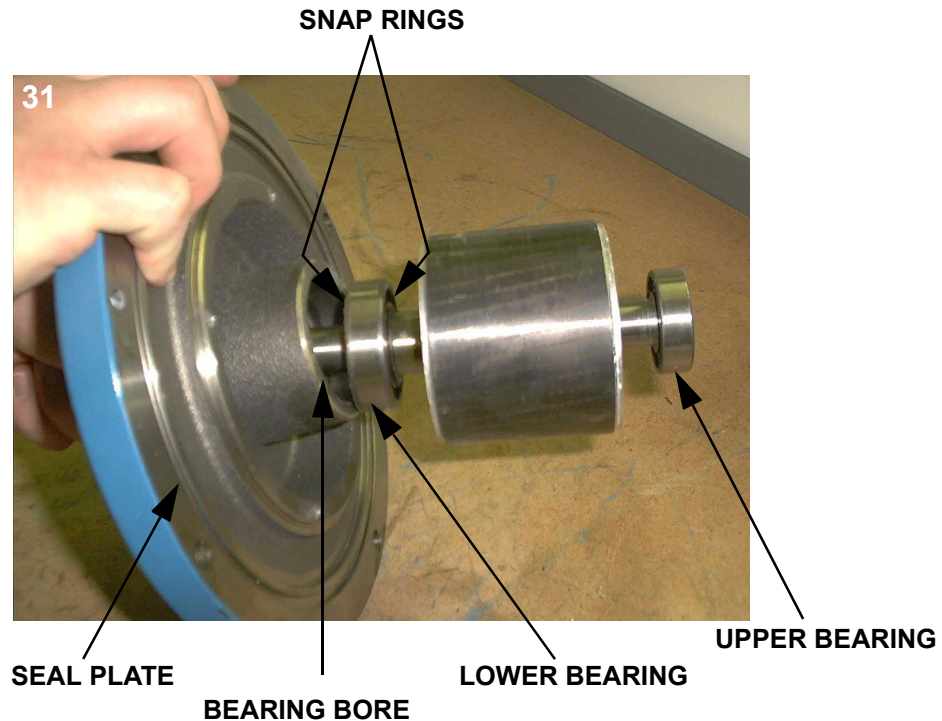




# SGPC 1 HP ASSEMBLY

## Bearing To Pump Rotor

When replacing bearings, be careful not to damage the rotor or shaft threads. Place snap ring into the motor shaft. Using an arbor press, hold the rotor and press the lower bearing on the shaft until it meets the snap ring. Then, press the upper bearing on the rotor shaft, applying force to the inner race of the bearing only. Next, using the arbor press, press rotor until it bottoms out in the seal plate bearing bore.



## Mechanical Seal, Lower Bearing, and Motor Rotor

**CAUTION:** Handle seal parts with extreme care! Do not scratch or mar lapped surfaces.

Lightly oil seal cavity in seal plate. Lightly oil (do not grease) outer surface of stationary member of seal. Press stationary members into seal plate using a seal pusher. Nothing but the seal pusher should come in contact with the seal face. Make sure the stationary member is straight and not cocked in the seal cavity.



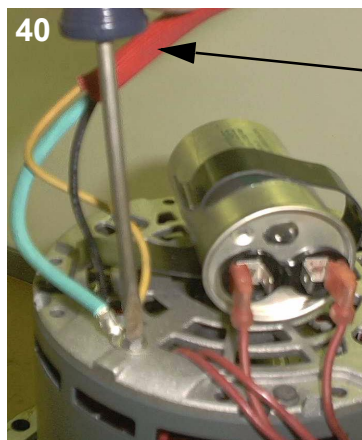
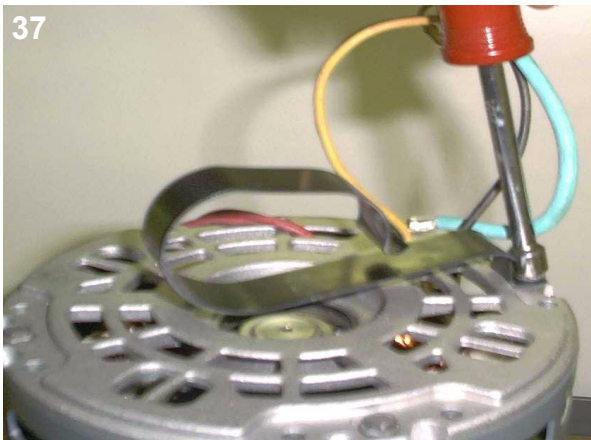
Finish assembling mechanical seal by sliding rotating member, spring, and cup onto shaft. Place snap ring onto shaft by compressing spring and setting in groove. This will keep the seal in place and under pressure.





## Motor Stator

Place the wave washer on top of the upper rotor bearing. A small amount of grease can be used to hold washer in place. Slide the stator over the rotor and check that it is resting on step in seal plate. Slide capacitor bracket onto one of the stator bolts and align stator bolts with mounting holes in seal plate. Torque bolts to 17 in./lb. Slide capacitor into bracket and connect motor leads with the flag terminals to capacitor connection tabs. Install ground wire into top of motor housing with #8 screw if removed.



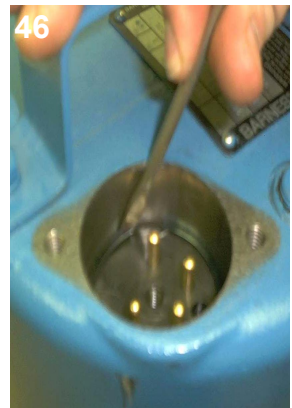
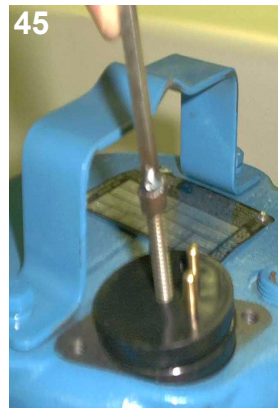
**NOTE:** Place fiberglass insulation around motor and ground leads, if removed.

## Motor Housing

Lubricate and set square ring into bore on seal plate.

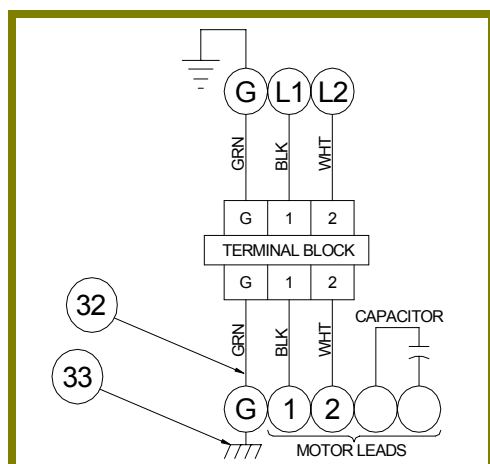


Pull wires through opening in top of motor housing while lowering motor housing onto seal plate and secure with two allen head bolts. Connect wires to pins in bottom of terminal block. (Check wiring diagram on next page to make sure all leads are connected to proper terminals) Lubricate O-ring and slide terminal block back into housing. Make sure terminal block is engaged and install snap ring to retain terminal block.

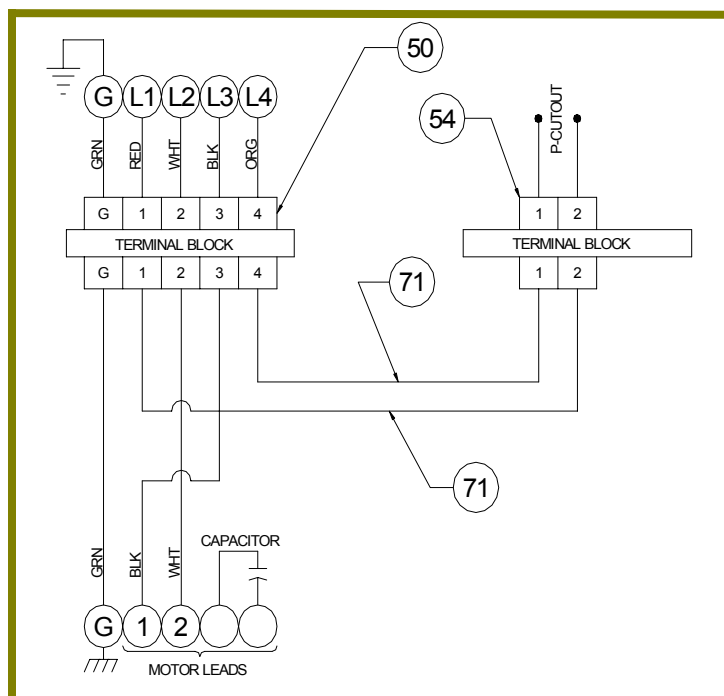


If there were optional pump features such as a float or pressure cutout, re-install those at this time also. Tighten bolts and lock washers into motor housing.

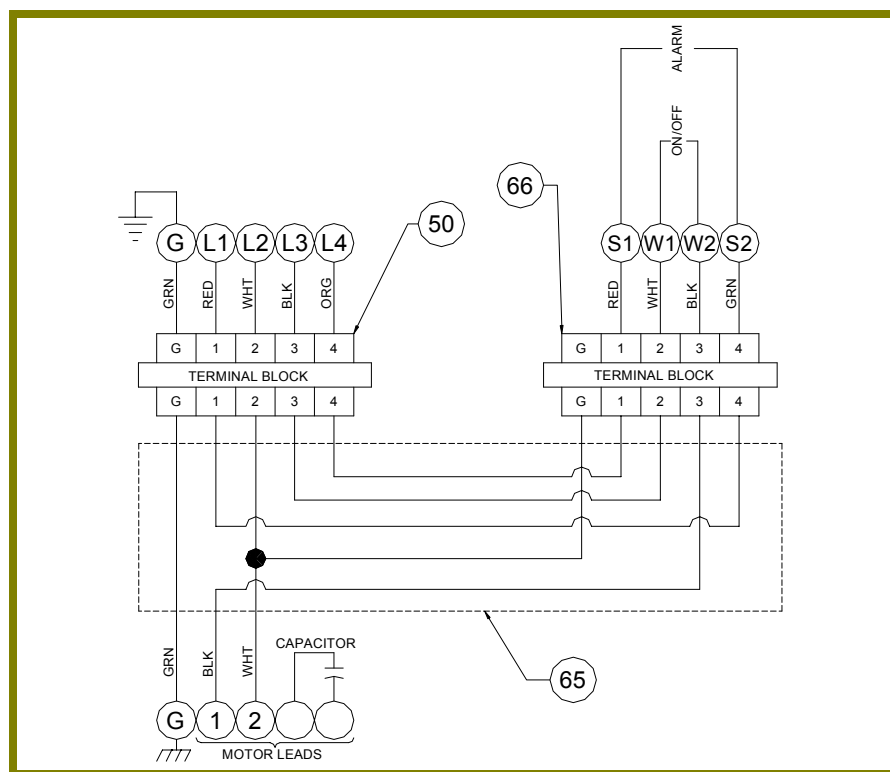
## Pin Placement Diagram



**SINGLE PHASE 120-240 VOLT AC (PSC)**



**SINGLE PHASE 240 VOLT AC (PSC)  
WITH PRESSURE CUT-OUT SWITCH OR  
SINGLE FLOAT AUTOMATIC PUMP VERSION**



**SINGLE PHASE 240 VOLT AC (PSC)  
WITH PRESSURE CUT-OUT SWITCH OR  
EZFLOAT VERSION (AU SERIES)**

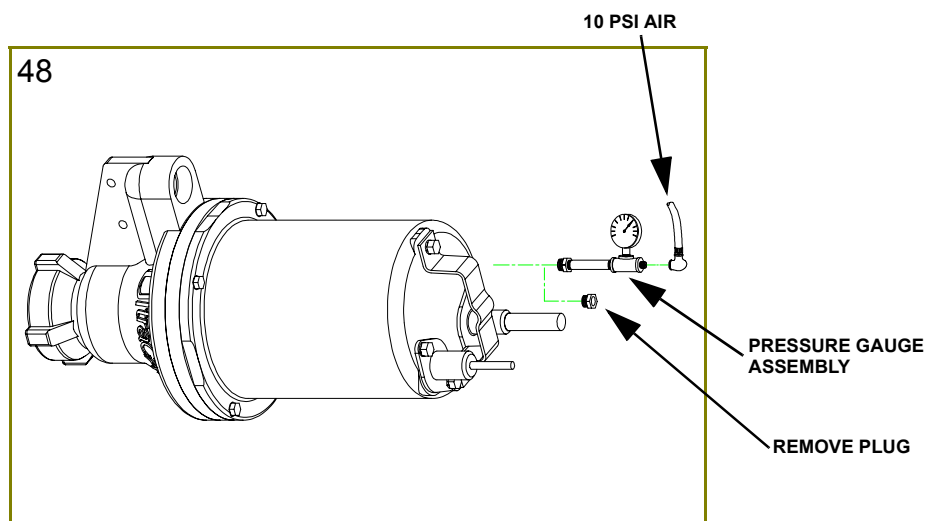


## Perform Pressure Check

**NOTE:** This is to be performed with NO oil in the housing.

**CAUTION:** Make certain that cord set is attached to pump. Performing the pressure check without the cord set on may cause the terminal block to blow out.

To check the pump for any seal leaks, attach the pressure gauge assembly using pipe sealant. Tighten the fitting into the hole. Pressurize the gauge from 8 to 10 psi. Use a soap solution around the sealed areas and inspect joints for air bubbles. If, after five minutes the pressure is still holding constant, and no bubbles are observed, slowly bleed the pressure and remove the gauge assembly. Replace the pipe plug using sealant. If the pressure does not hold, then the leak must be located and repaired.





## Suction Housing

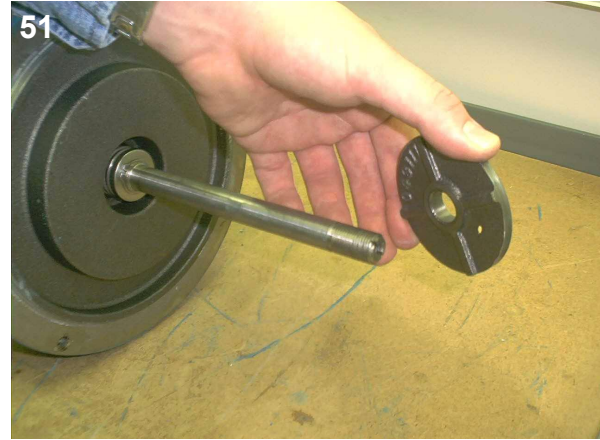
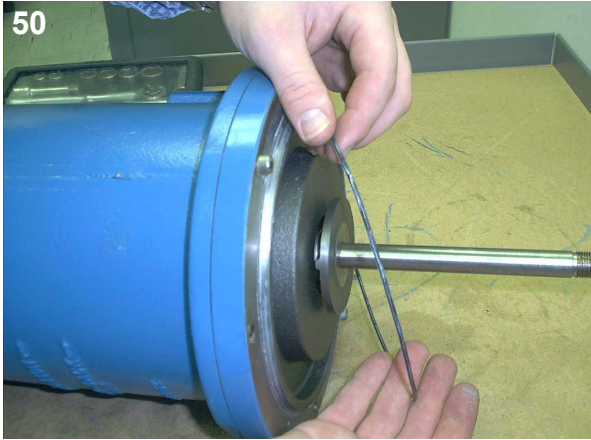
Press the shredding ring back into the bottom of the housing using an arbor press. Check to be sure shredding ring is not cocked.

Place stator into suction housing and put retainer plate over top. Make sure lip of stator is in groove of retainer plate. Secure retainer plate with 1/4" flathead screws. Torque evenly in a cross pattern to 6.5 ft./lb.



## Pump Rotor and Upper Pump Assembly

Place O-ring around bore on bottom of seal plate. Slide pump-out spacer and pump rotor onto motor shaft.

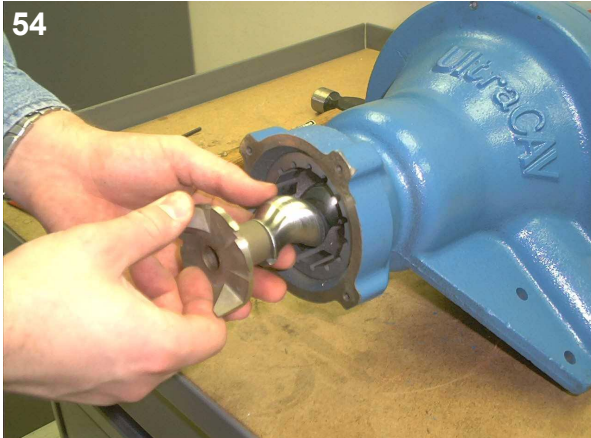


Lightly coat outside of pump rotor with food grade grease. Lower the upper pump assembly onto suction housing. Align the motor housing so the lifting handle is inline with the discharge port on the suction housing. Secure suction housing to upper pump assembly with the 5/16" hexhead bolts and lock washers. Place pump on its side with bottom of suction housing facing out.



Turn the rotor so it is slightly below edge of stator. Thread cutter onto shaft while engaging tabs with rotor. Turn the shaft counter clockwise while holding the cutter stationary

**CAUTION:** Cutting surfaces are sharp!



Tap the cutter tooth with a punch to snug the cutter on the shaft. Place counter sunk washer onto 1/4" flathead allen screw. Apply a drop of green loctite onto the 1/4" allen screw. Thread the screw into motor shaft and tighten to 6.5 ft./lb.



## Replacing Oil

**NOTE:** Repeat all electrical checks and pressure tests prior to replacing oil.

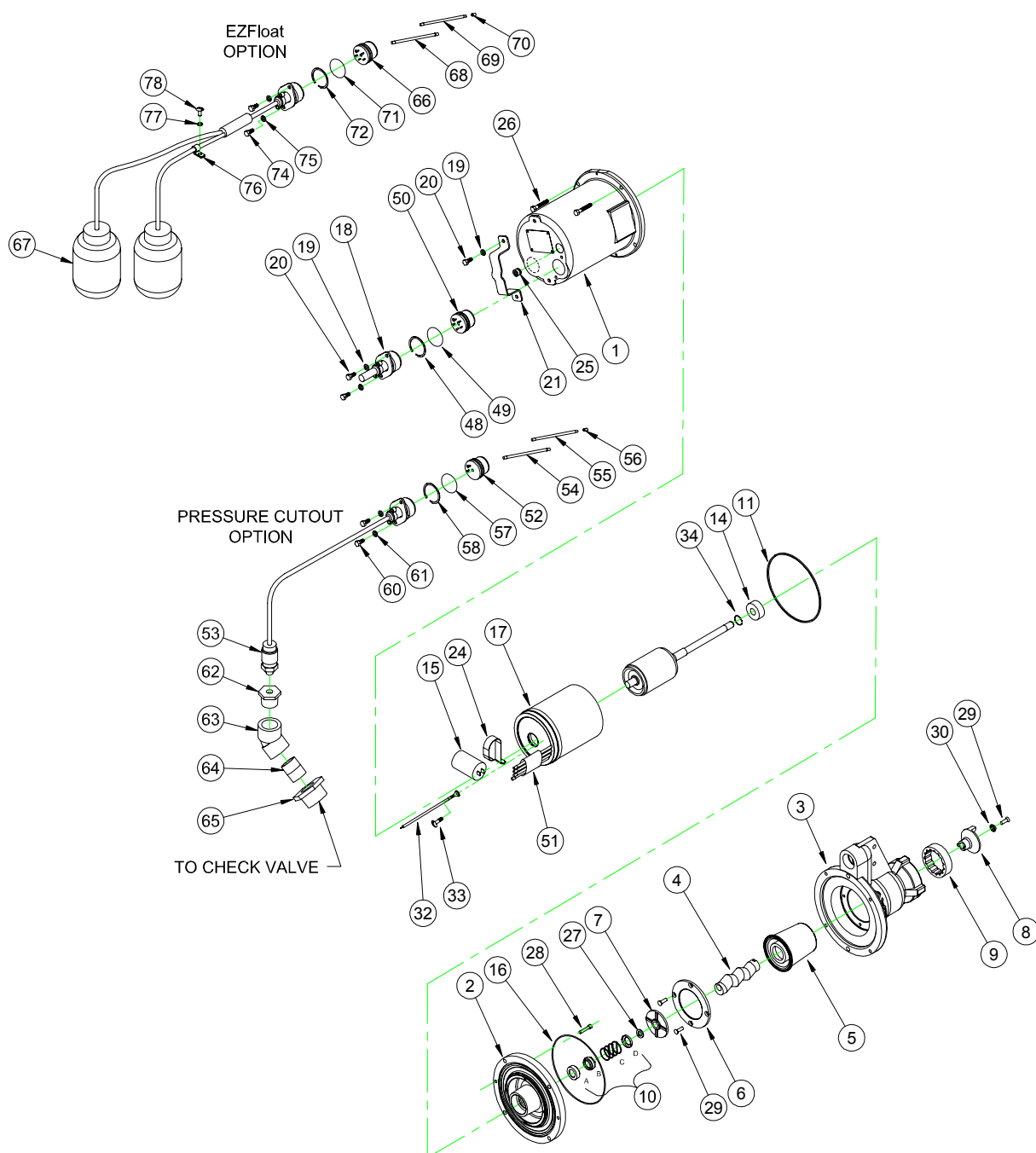
Motor housing - Set unit upright and refill with (see chart for type and amount) new cooling oil. Fill to 1" above motor as an air space must remain in the top of the motor housing to compensate for oil expansion. Apply pipe thread compound to threads of pipe plug and assemble to motor housing.

**NOTE:** Reference oil chart for suitable replacement oils.

SUPPLIER	GRADE
BP	Enerpar SE 100
Conoco	Pale Paraffin 22
Mobile	D.T.E. Oil Light
G & G lol	Cirulating 22
Imperial Oil	Voltesso-35
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX
Woco	Premium 100



# Exploded View of SGPC 1 HP



## Parts Kits

Seal Repair Kit.....P/N: 110477

Overhaul Kit.....P/N: 110478

Cutter Kit.....P/N: 110479

## PARTS LIST

ITEM	QTY	PART No.	DESCRIPTION
1	1	105196 105196HA	Motor Housing Housing w/Press, cutout or EZFloat
2	1	084343	Seal Plate
3	1	101771	Suction Housing
4	1	101796	Rotor
5	1	101797	Stator
6	1	101772	Stator Retainer
7	1	101773A	Pumpout Spacer
8		101774	Radial Cutter
9		082085	Shredding Ring
10		067562	Shaft Seal
11	1	027269	Tetra Seal
12	113 oz.	029034	Cooling Oil
14	1	039734	Ball Bearing
15	1	038255 070965	Capacitor 115V/1Ph, 370V, 60MFD 230V/1Ph, 370V, 25MFD
16	1	102171	O-ring
17	1	102643BG 101729BG	Motor 1HP, 115V, 1Ph 1HP, 230V, 1Ph
18	1	109498	Cord Set, 15 ft. (STD)
18A	1	103582	Compression Flange*
19	4	026322	Lockwasher, 5/16, SS
20	4	1-156-1	Hex Hd. Capscrew, 5/16-18 x 1.00", SS
21	1	103503	Lifting Handle
24	1	039858	Capacitor Bracket
25	1	014270	Pipe Plug
26	4	1-140-1	Screw, 5/16-18, SS
27	1	107481	Snap Ring
28	2	084948	Sck. Hd. Screw, 1/4-20, SS
29	5	070704	Flt. Hd. Screw, 1/4-20, SS
30	1	067556	Washer, Cutter, SS
32	1	105111A	Wire Assy, 10GA, Green
33	1	016660	Self Tapping Screw, #8-32, SS
34	1	061143	Snap Ring
36	A/R	-----	Loctite 609
37	A/R	-----	Loctite 242
39	A/R	-----	Permatex 2C
41	A/R	-----	Grease, Food Grade, 450 deg. MP

ITEM	QTY	PART No.	DESCRIPTION
48	1	105197	Snap Ring
49	1	2-31051-224	O-ring
50	1	103760	Terminal Block
51	1	625-02117	Sleeving
<b>PRESSURE CUTOUT SWITCH OPTION</b>			
52	1	103759	Block, Terminal, 2 pin
53	1	111787	Switch, Pressure, Cutout
54	1	105147B	Wire, Jumper, 10"
55	1	105149	Wire Jumper
56	1	625-00163	Connector, Wire
57	1	2-31051-224	O-ring
58	1	105197	Snap Ring
60	2	1-156-1	Hex Hd. Capscrew, 5/16-18 x 1.00", SS
61	2	26322	Lockwasher, 5/16
62	1	111203	Reducer Bushing, 1.00" NPT x 1.50" Lg.
63	1	111202	Elbow, Pipe, 1.00" NPT
64	1	111201	Nipple, Pipe, 1.00" NPT x 1.50" Lg.
65	1	111204	Reducer Bushing, 1.50" NPT x 1.00" NPT
<b>FLOAT OPTION</b>			
66	1	103759 112322	Block, Terminal, 2Pin-Single Block, Terminal, 5Pin- EZFloat
67	1	103746 112336	Float Switch - Single Dual Float Switch-EZFloat
68	1 3	105147B 105147A	Wire, Jumper, 10"-Single Wire, Jumper, 10"-EZFloat
69	1 2	105149 105149A	Wire, Jumper - Single Wire, Jumper - EZFloat
70	1	625-00163	Connector, Wire
71	1	2-31051-224	O-ring
72	1	105197	Snap Ring
74	2	1-156-1	Hex Hd. Capscrew, 5/16-18 x 1.00", SS
75	2	026322	Lockwasher, 5/16
76	1	090516	Clip, Cord, Lined
77	1	20-12-1	Lockwasher, #10
78	1	11-17-1	Socket Hd. Screw 10-32 x .375" Lg.

Contact your local Distributor or the Factory for other seal materials, cord lengths, and other Optional equipment.

\*Included with Cable Set Item 18



